Middle School Initiative

PART I
COVER SHEET

CAP 5 SEMESTER 1 WEEK 2

COURSE: Leadership Officer Leadership Laboratory - Achievement 12

LESSON TITLE: Logic in Problem Solving

LENGTH OF LESSON: 50 Minutes

METHOD: Lecture/Discussion

REFERENCE(S): *Leadership: 2000 And Beyond*, Volume II, Chapter 11

AUDIO/VISUAL AIDS/HANDOUTS/ACTIVITY MATERIAL: Transparencies

COGNITIVE OBJECTIVE: The purpose of this lesson is for each cadet to:
1. Know the definition of logic.
2. Become aware of the barriers to logic.
3. Know the types of reasoning.
4. Acquaint themselves with the fallacies that impede logical decision-making.

COGNITIVE SAMPLES OF BEHAVIOR: Upon completion of this class, each cadet should be aware of the primary steps in applying logic to the process of problem solving.

AFFECTIVE OBJECTIVE: N/A

AFFECTIVE SAMPLES OF BEHAVIOR: N/A

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PART II
TEACHING PLAN

Introduction

ATTENTION: Good afternoon and welcome to your first academic class in the fifth year of the Civil Air Patrol Middle School Initiative.

MOTIVATION: Being a good subordinate is part of being a good leader. Everyone is part of a team, and all members have responsibilities that go with belonging to that team. Isn't this logical?

OVERVIEW: During our class today, we are going to delve into the process of applying logic to problem solving. We will look at what logic is, some of the barriers to the application of logic, types of reasoning used in the application of logic, some fallacies involved in logical thinking, and knowing fact from fiction.

TRANSITION: Are we ready to see what logic really is?

Body

MP 1 Before we can apply logic to problem solving, we must know what logic is. Logic is generally defined as the science of correct reasoning; the science which deals with the criteria of valid thought. This is nothing more than the analysis of the ideas behind any statement.

MP 2 In previous achievements you were introduced to decision-making and problem solving. In making certain decisions and solving the problems presented, were you not using some sort of logic to attain the desired goal of the achievement?

You were given problems to solve that required deductive reasoning. Decisions had to be made based on facts and opinions presented to you. Distinguishing between facts and opinions can be a challenge to the decision-maker. Facts and opinions can be strongly influenced by personal feelings, emotions and prejudices. Reported facts must be current and complete. Are you, or were you, in a position to learn the facts? Are you an expert in the area of responsibility in which the decisions must be made? Are your opinions based on thorough knowledge of your area of expertise?

MP 3 Decisions made in problem solving must be based on the process of logical thinking. Many of us fail to think logically because of barriers that are caused by our individual temperaments and, in many cases, partly by the environment in which we are working.

Let’s take a look at some of these barriers that influence your logic.

NOTE: These items will be discussed with the cadets with their textbooks closed. You want their input, not the textbook answer.

TRANSPARENCY LL12.1.1 - Barriers to Logic

Laziness - No desire to do serious thinking. Takes too much time and requires double-checking of facts and opinions.

Pretentiousness - Some "experts" have a smattering of knowledge on everything and can talk about anything with the air of authority.

Skepticism - The philosophical doctrine that the truth of all knowledge must always be in question and that inquiry must be a process of doubting.

Wishful thinking - Generally, the belief that something is true or will become true just because the thinker wants it that way.

Rationalizing - This is the principle or practice of accepting reason as the only authority in determining one’s opinions or course of action. We might apply a psychological definition at this point: to devise superficially, rational, or plausible, explanations or excuses for one’s acts, beliefs, desires, etc., usually without being aware that these are not the real motives.

External Influences - Some things in your environment require little or no thought. For instance, watching a television show that has no real plot - just provides some sort of entertainment, requires little of your thinking processes. Step back in time to the year 1938 - the Orson Wells production of "War of the Worlds" on CBS radio. Even though there were several disclaimers that the program was fictional, it was so well presented that many listeners thought it was a real war. These people did not hear the disclaimers and were influenced by what they heard. They thought about it and were scared.

NOTE: Any answers that you receive from the cadets that may guide you in the general direction of their text, or this lesson plan, are good. We are developing their thought processes and involving them in the development of logical thought.

TRANSITION: We have seen some barriers to logical thinking, so now we will look at the types of reasoning and how they fit into the process of logical thinking.

MP 4 Before you accept as valid, the ideas and conclusions of any authority, you should check the authority’s reasoning processes. We will discuss two types of reasoning today; they are inductive and deductive.

The first area, inductive reasoning, uses conclusions drawn from the study of evidence presented in the case study. During this process of inductive reasoning you may generalize, hypothesize, seek cause and effect, or use any combination of the three.

Generalization is the most common method of inductive reasoning. This method of reasoning allows you to take particulars and expand them to a point where you might infer something that is vague, but may be essential to your decision-making. Generalizing may also be a stumbling block if you use too few samples of relevant information.

Hypothesis is a system or theory imagined or assumed to account for what is not understood. To suppose something would fit in this category of inductive reasoning.

In using cause and effect, one might deduce that a particular action (cause) would have, or could have had, an effect on the case being studied. An aircraft crash investigation could use this method as part of the reasoning process.

The second area, deductive reasoning, follows a set pattern. Here, you make propositions for further discussion and make inferences. The propositions are arranged in a set pattern so that they all relate to one another. New conclusions can be reached more readily, now. Deductive reasoning follows a prescribed pattern, called a syllogism, and contains nothing but true statements.

A syllogism is an argument or form of reasoning in which two statements are made and a logical conclusion is made from them. There are two significant types of syllogisms, categorical and hypothetical.

Let's look at the first one: categorical. This type has a major premise, a minor premise and a conclusion that are drawn from factual information. Example #1, on Page 11-3, in you text is a classic example of this type.

The major premise is: All CAP senior member officers are over eighteen years of age.
The minor premise is: Sturdivant is a CAP senior member officer.
The conclusion is: Sturdivant is over 18.

Here we see that nothing but actual facts are used and the conclusion is based on those facts.

The second type, the hypothetical syllogism, is a little ambiguous and allows your opinion to enter into the equation. The two examples on Page 11-3 illustrate this.

TRANSPARENCY LL12.1.2 – Hypothetical Syllogism

NOTE: The instructor will discuss the similarity and differences in the two examples, showing how a minor premise change can affect the conclusion.

TRANSITION: We have seen how inductive and deductive reasoning can affect our logical decision making process. Let's take a look now at a large stumbling block in the logical decision/problem-solving arena - fallacies.

MP 5 A fallacy is an argument or proposition, which is apparently sound though really deceptive. The statement may contain an error that is not obvious and will tend to mislead you.

In the text examples, you will note that all things are not what they seem to be. That which appears to be a true conclusion is not because the major and minor premises do not fully relate to each other.

Time in this period does not allow us to fully discuss this particular stumbling block to logical thinking. So, to finish this subject area, read the rest of the section in your text on fallacies, on your own time. When you have completed that assignment, fill in the appropriate answers in the chapter review, on just the subject area that has been covered today.

Conclusion

SUMMARY: In summation, during this class today we have discussed some barriers to the application of logic, looked into two types of reasoning and touched lightly in the area of fallacies. You previously have used much of what we have discussed, probably without realizing you were doing so.

REMOTIVATION: *"The future of our force, more so than technology, more than the amount of money we have, will be determined by the quality of our people. So, we have to train and educate them, but probably the most important thing is mentoring them properly"*

- General Ed Eberhart, USAF
Commander, USAF Space Command
August 2000

Is there any logic in the general's statement?

CLOSURE: If there are no questions about this subject, class is dismissed.

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PART III
LESSON REVIEW

LESSON OBJECTIVE(S): The objective of this lesson is for each cadet to understand the principle of logic in problem solving.

LESSON QUESTIONS: Completion of the chapter review exercise satisfies this requirement